

WHAT IS CLAIMED IS:

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1. A syringe for use with a powered injector to inject a fluid into a patient, the syringe comprising:

a length of material adapted to propagate electromagnetic energy therethrough, the length of material including at least a first indicator positioned along the length of material, the first indicator being adapted to interact with at least a portion of the energy being propagated through the length of material in a manner that is detectable, the first indicator providing information about the syringe configuration.

2. The syringe of Claim 1 comprising a plurality of indicators along the length of the material at unique predetermined positions, each of the indicators being adapted to interact with at least a portion of the energy being propagated through the length of material in a manner that is detectable, the predetermined positions of the indicators providing information about the syringe configuration.

3. The syringe of Claim 1 wherein the indicator is adapted to absorb at least a portion of the energy or to scatter at least a portion of the energy.

4. The syringe of Claim 1 wherein the indicator includes a detection material that is placed in a detectable state upon impingement of the energy.

5. The syringe of Claim 4 wherein the electromagnetic energy is light energy and the detection material fluoresces upon impingement thereupon by light energy.

6. The syringe of Claim 1 wherein the length of material is formed integrally with the syringe.

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7. The syringe of Claim 6 wherein the length of material is a portion

8. The syringe of Claim 7 wherein the electromagnetic energy is light

9. The syringe of Claim 7 wherein the indicator is an angled surface

10. The syringe of Claim 7 comprising at least a first plurality of

11. The syringe of Claim 1 wherein the length of material is attachable

12. The syringe of Claim 10 wherein the first plurality of indicators

13. The syringe of Claim 12 further comprising at least a second

4. A syringe encoder comprising:

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a length of material adapted to propagate electromagnetic energy therethrough, the length of material including at least a first indicator positioned along the length of material, the first indicator being adapted to interact at least a portion of the energy being propagated through the length of material in a manner that is detectable, the first indicator providing information about syringe configuration.

15. The syringe encoder of Claim 14 comprising at least a first plurality of indicators along the length of the material at unique predetermined positions, each of the indicators being adapted to interact with at least a portion of the energy being propagated through the length of material in a manner that is detectable, the predetermined positions of the indicators providing information about syringe configuration.

16. The syringe encoder of Claim 14 wherein the syringe encoder is formed integrally with a syringe.

17. The syringe encoder of Claim 14 wherein the syringe encoder is attachable a syringe.

18. The syringe encoder of Claim 14 wherein the syringe encoder is formed integrally with a syringe adapter.

19. The syringe encoder of Claim 14 wherein the syringe encoder is attachable to a syringe adapter.

20. The syringe encoder of Claim 15 wherein the first plurality of indicators represents a first binary code.

21. The syringe encoder of Claim 20 further comprising at least a second plurality of indicators along the length of the syringe wall at unique

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method of fabricating a syringe, the method comprising:

providing a material in the syringe;

providing an indicator along the length of the syringe;

at least a portion of the end of the syringe is detectable, the first indicator

Abstract

method of fabricating a syringe, the method comprising:

providing a material in the syringe;

providing an indicator along the length of the syringe;

at least a portion of the end of the syringe is detectable, the first indicator

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at least a portion of the end of the syringe is detectable, the first indicator

25. An injector system for use with a syringe comprising: a syringe encoder, a powered injector, the powered injector including a powered drive member to pressurize contents of a syringe, at least one energy source, and at least one sensor; the syringe encoder including a length of material adapted to propagate electromagnetic energy therethrough, the length of material including at least a first indicator positioned along the length of material, the first indicator being adapted to interact with at least a portion of the energy from the energy source being propagated through the length of

material in a manner that is detectable by the sensor, the first indicator providing information about the syringe configuration.

26. The injector system of Claim 19 wherein the syringe encoder is formed integrally with the syringe.

27. A method of encoding information about syringe configuration, the method comprising the steps of: propagating energy through a least a portion of a length of material, providing at least a first indicator positioned along the length of material, the first indicator being adapted to interact with at least a portion of the energy being propagated through the length of material in a manner that is detectable, and detecting the modification of at least a portion of the energy, the indicator providing information about syringe configuration.

28. A set of at least two syringes for use with a powered injector to inject a fluid into a patient, the first syringe comprising:

a length of material adapted to propagate electromagnetic energy therethrough, the length of material including at least one indicator positioned along the length of material,

the at least one indicator of each syringe being adapted to interact with at least a portion of the energy being propagated through the length of material of that syringe in a manner that is detectable, the at least one indicator of each syringe providing information about a unique configuration of the syringe upon which the at least one indicator is positioned.

29. An encoder comprising: a length of material adapted to propagate electromagnetic energy therethrough, the length of material including at least a first indicator positioned along the length of material, the first indicator being adapted to interact at least a portion of the energy being propagated through the length of material in a manner that is detectable, the first indicator providing encoded information.

30. The encoder of Claim 22 comprising a plurality of indicators along the length of the material at unique predetermined positions, each of the indicators being adapted to interact with at least a portion of the energy being propagated through the length of material in a manner that is detectable, the predetermined positions of the indicators providing information.

31. A method of encoding information, the method comprising the steps of: propagating energy through at least a portion of a length of material, providing at least a first indicator positioned along the length of material, the first indicator being adapted to interact with at least a portion of the energy being propagated through the length of material in a manner that is detectable, and detecting the interaction of at least a portion of the energy, the indicator providing information.

32. A syringe for use with a powered injector to inject a fluid into a patient, the syringe comprising:

a translucent length of material, the length of material including a plurality of indicators formed along the length of material, each of the indicators including a first, generally flat surface that is angled with respect to an orientation of light propagated through the length of material to redirect at least a portion of the light in a manner that is readily detectable, the indicators providing information about the syringe configuration.

33. The syringe of Claim 32 wherein each indicator includes a notch in the length of material, the notch including a second surface through which the light passes to contact the first surface, the first surface reflecting a portion of the light.

34. A method of fabricating syringes with information encoded therein, the method including the steps of:

including in each syringe a length of translucent material,

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5 about the syringe configuration.

38. The syringe of Claim 37 including at least a first plurality of indicators positioned along the syringe wall at different longitudinal positions, the first

Figure 1. The effect of the number of iterations on the accuracy of the proposed algorithm. The accuracy is measured by the number of correct elements in the solution set. The number of iterations is 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260, 270, 280, 290, 300, 310, 320, 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690, 700, 710, 720, 730, 740, 750, 760, 770, 780, 790, 800, 810, 820, 830, 840, 850, 860, 870, 880, 890, 900, 910, 920, 930, 940, 950, 960, 970, 980, 990, 1000. The accuracy is 0.0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0.

plurality of indicators representing a binary code providing information about the syringe configuration.

39. The syringe of Claim 36 wherein the syringe wall is generally cylindrical in shape and the syringe further includes at least a first plurality of indicators aligned along the syringe wall at different longitudinal positions such that a beam of light from a single light source can be propagated through the syringe wall in a direction generally parallel to the axis of the syringe to interact with each of the first plurality of indicators.

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